

ABSTRACT

A method for fabricating a flash memory device is disclosed. The method for fabricating a flash memory device according to the present invention comprises the steps of:
5 forming a tunnel oxide layer by depositing a material with a conduction band energy level lower than that of SiO_2 on a semiconductor substrate; forming a floating gate by depositing polysilicon on the tunnel oxide layer; forming an intergate
10 dielectric layer on the floating gate; forming a control gate on the intergate dielectric layer; forming a gate electrode by patterning the tunnel oxide layer, the floating gate, the intergate dielectric layer and the control gate; and forming a source/drain region by implanting impurities into the
15 substrate using the gate electrode as a mask.

Thus, a method for fabricating a flash memory device according to the present invention enables injection of electrons into a potential well formed in a floating gate by F/N or direct tunneling as well as hot electron injection by
20 using a tunnel oxide layer with a conduction band energy level lower than that of SiO_2 used conventionally or by using a first tunnel oxide layer with a conduction band energy level lower than that of SiO_2 and a second tunnel oxide layer with a conduction band energy level equal or similar to that of SiO_2 .
25 Consequently, a program speed of the present invention is faster than that of the prior arts. In addition, the amount of energy lost during the injection of electrons into the potential well formed in the floating gate decreases. Accordingly, endurance characteristics featured by a change in
30 a threshold voltage of a floating gate device by a trap formed by repeated read and write operations are also enhanced.

In addition, retention characteristics are enhanced because it is very rare that electrons confined in the potential well of the floating gate move out to a conduction

band of a P-type substrate or a control gate. Moreover, erase speed is enhanced as tunneling length for electrons confined in the potential well formed in the floating gate decreases.

5 In conclusion, the present invention can enhance program, erase, retention, and endurance characteristics of a flash memory device by the increase in efficiency of hot electron injection.